

REMARKS

Reconsideration is respectfully requested.

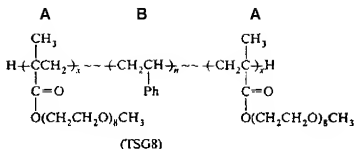
I. Status of the Claims

Claim 1 has been amended to incorporate the subject matter of claim 2 regarding the definition of block chain C. Accordingly, claim 2 has been canceled without prejudice, and claims 6, 9, and 11 have been amended to depend from claim 1. Upon entry of this amendment, claims 1 and 3-27 are pending. No new matter has been added to the application.

II. Claim Rejection

Claims 1-27 have been rejected under 35 U.S.C. § 103(a) as being obvious over Khan et al. (Makromolekulare Chemie 1989, 190(5):1069-1078; "Kahn") in view of Giles et al. (U.S. Patent No. 5,196,484; "Giles"). According to the Examiner, the only difference between Khan and the present invention is the sequence of the block chains A, B, and C. (Office Action, page 4, lines 3-5.) The Examiner's position is that it would have been obvious to one having ordinary skill in the art to place the **A** block in the middle of the Kahn **ABA** block (i.e., to form a **BAB** block copolymer) as taught by Giles in order to reduce ambient temperature crystallization. (Office Action, page 3, lines 11-12; page 5, lines 14-19.)

However, the motivation cited by the Examiner ("to reduce ambient temperature crystallization") does not relate to block chain rearrangement. Giles teaches that short oxyalkane sequences, i.e., low values of m , are desirable to reduce ambient temperature crystallization. Preferably, the value should lie between 7 and 17. (See Giles, col. 5, lines 8-15). Based on this teaching, a skilled artisan that wished to reduce ambient temperature crystallization would use short oxyalkane sequences. Therefore, a skilled artisan that wished to reduce ambient temperature crystallization in the Kahn **ABA** block copolymer,



would shorten the oxyethylene side chains. Contrary to the Examiner's contention, this would not result in a rearrangement of the block chain sequence; it would only affect the length of the side chains in the **A** blocks.

For the above reasons, Applicants reiterate their position that the Examiner has not cited any motivation in the prior art for rearranging the Kahn **ABA** block copolymer as alleged or put forth any other reason that it would have been obvious to do so.

Applicants have previously presented evidence that the claimed arrangement of copolymer block chains was nonobvious based on their unexpectedly superior conductive properties compared to the prior art. *See* pages 10-11 of May 30, 2007 Response. The room temperature conductivities of copolymer-LiClO₄ electrolyte complexes disclosed by Kahn range from 0.7 to 1.2 × 10⁻⁶ Ω⁻¹ · cm⁻¹ (Table 4). In contrast, experimental data show the presently claimed copolymer-LiClO₄ electrolyte complexes exhibit conductivities that are greater by more than an order of magnitude—from 5 × 10⁻⁵ to 1 × 10⁻⁴ Ω⁻¹ · cm⁻¹ (Examples 1-4 of the Specification).

In response, the Examiner stated that “it is worth to mention that Khan discloses that the ion conduction can reach values of $10^{-4} \Omega^{-1} \cdot \text{cm}^{-1}$ at 70°C , depending on salt and styrene content (abstract).” However, Khan states that “[a]ddition of dimethyltetraethyleneglycol (2,5,8,11,14-pentaoxapentadecane) enhances the ion conduction which can reach values of $10^{-4} \Omega^{-1} \cdot \text{cm}^{-1}$ at 70°C , depending on salt and styrene content.” (Abstract, emphasis added.)

Adding DMTEG, a plasticizer, to a polymer electrolyte and increasing temperature increases the conductivity of the electrolyte (somewhat at the expense of the mechanical properties

of the polymer due to the plasticizer). (See Kahn, page 1077, 2nd paragraph; Table 3). In contrast, the Applicants measured the conductivities of the presently claimed solid polymer electrolytes without DMTEG and at room temperature.

Accordingly, conductivity measured (1) after the addition of dimethyltetraethylene glycol (DMTEG) and (2) at a much higher temperature does not relate to that measured by Applicants and fails to show that the results were ordinary or expected. The nature of the Applicants' results should only be compared to the data from Kahn at room temperature and in the absence of DMTEG—from 0.7 to $1.2 \times 10^{-6} \Omega^{-1} \cdot \text{cm}^{-1}$ (Table 4).

Moreover, neither Kahn nor Giles suggests that rearranging the block chains of Kahn would improve conductivity, let alone to the degree discovered by the Applicants. In fact, as previously argued (see page 9, last paragraph of May 30, 2007 Response), Kahn teaches away from this rearrangement. Khan states that increasing the amount of the polystyrene block will lower the conductivity. Accordingly, the conductivities of the presently claimed solid polymer electrolytes were not only superior to the those of the prior art but also unexpected. See *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, slip op. at 12 (2007) (“[W]hen the prior art teaches away from combining certain known elements, discovery of successful means of combining them is more likely to be nonobvious.”)

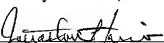
As amended, claim 1 recites a solid polymer electrolyte comprising an electrolyte salt and a copolymer containing repeating units A, B, and C—each having a particular formula—arranged in a B, A, C sequence. Similarly, claim 16 recites the copolymer itself. For at least the above reasons, the claimed copolymer and solid polymer electrolyte comprising the same are nonobvious over the cited references, Kahn and Giles. Applicants respectfully request that the rejection be withdrawn and the claims allowed.

CONCLUSION

In view of the above amendments and remarks, Applicants believe the pending application is in condition for allowance. If there are any remaining issues that the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

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